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EXAMINER	
DANIELS, MATTHEW J	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 09/731,945	Applicant(s) WALDROP ET AL.
	Examiner Matthew J. Daniels	Art Unit 1732

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 April 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *13-15,18-27 and 34-57* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-15,18-27 and 34-57* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 46-49 and 54-57 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: locating the preform on the mold in Claims 46 and 54.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 13, 14, 20-22, 25, 27, 34, 35, 39-40, 43, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hooper (US Patent No. 5,576,030) in view of Cochran *et al.* (US Patent No. 5,116,216) and Lang *et al* (US Patent No. 6,406,659).

Hooper ('030) teaches the basic claimed process of making a fiber reinforced composite including, providing a preform laminate (20), placing said perform laminate (20) onto a mold (12), providing a first bag (32) against said mold (12) to form a first chamber, sealing a second

bag which is a vacuum bag against said mold (12), drawing a vacuum onto said first bag and said second bag using port (16), a second port (44), and infusing a resin using port (42) (see col. 4, line 43 through col. 5, line 33).

Regarding claims 13 and 34, although Hooper ('030) teaches a first and a second bags, Hooper ('030) does not teach that the first bag is a vacuum bag and is sealed to the mold, or that the pressure in the second vacuum chamber is equal to or greater than the pressure in the first vacuum chamber.

However, Lang *et al* teach a first (185) and second (189) vacuum bags, each sealed to the mold (183). Lang *et al* further teach that the vacuum or pressures in the first and second bags are separately manipulated to provide resin flow channels or resin distribution (9:60-10:28), and doing so substantially collapses the second vacuum chamber against the first vacuum chamber (Fig. 10), resulting in resin flow channels (203). Thus, in view of the teaching to manipulate pressure in the two vacuum chambers (7:15-40, 8:38-46, and Claim 1), the particular pressures represent result effective variables that the ordinary artisan would modify, adjust, and optimize in order to provide resin channels or distribution. Additionally, Lang *et al* teach that in at least one embodiment, it is desirable to maintain a vacuum on both sides of the flexible membrane such that the flexible membrane does not deform (5:44-46) such that the resin presses the flexible membrane open to create channels (5:52-56). In maintaining a vacuum on both sides of a flexible membrane such that the membrane does not deform, it would have been obvious to use a second vacuum pressure equal to the first vacuum pressure during resin injection in order to avoid deformation of the first flexible membrane.

Cochran *et al.* ('216) teach a resin impregnation process including, providing a fibrous pre-preg (61), placing said pre-preg (61) onto a mold (71), sealing a first vacuum bag (89) against said mold (12) to form a first vacuum chamber, sealing a vacuum cover (93) to form a second vacuum chamber, drawing a vacuum onto said first vacuum chamber and onto second vacuum chamber such that the pressure within said second chamber is higher than the pressure within said first chamber and impregnating said fibrous pre-preg by applying heat (see col. 5, line 60 through col. 6, line 11 and Figure 3).

It would have been obvious for one of ordinary skill in the art to combine the methods of Cochran *et al* and Lang *et al* for the following reasons:

(a) Hooper suggests a need to insure that the vacuum path remains open so that it is equally drawn from all areas of the lay up (2:42-49) and to distribute the resin in a way that even resin distribution is ensured (2:57-63) using two impermeable sheets (32,36), and this is substantially what is provided by Lang (3:7-4:40).

(b) It would have been obvious for one of ordinary skill in the art to provide a higher pressure within the second vacuum chamber as compared to the first vacuum chamber as taught by Cochran *et al.* ('216) in the process of Hooper ('030) because Cochran *et al.* ('216) specifically teaches that a higher pressure in the second vacuum pressure provides for improved gas removal, hence providing for a porous free product that exhibits improved characteristics.

Regarding claims 14 and 35, Hooper ('030) and Cochran *et al.* ('216) do not teach debulking the preform. Lang *et al.* ('659) teach a vacuum assisted resin transfer process including, applying a vacuum to a first vacuum chamber prior to resin infusion in order to eliminate entrapped air bubbles, hence teaching debulking of the preform prior to resin infusion

(see col. 3, lines 7-10). Therefore, it would have been obvious for one of ordinary skill in the art to debulk the preform as taught by Lang *et al.* ('659) in the process of Hooper ('030) in view of Cochran *et al.* ('216) because, Lang *et al.* ('659) teach that debulking eliminates entrapped air bubbles, hence providing for a porous free product that exhibits improved characteristics.

In regard to claim 22, Hooper ('030) teaches a breather layer (34) positioned between the inner and outer vacuum bags (see col. 5,lines 13-18).

Specifically regarding claims 25 and 43, Hooper ('030) teaches a first vacuum port or tube (16) for drawing a vacuum onto said first vacuum chamber and a second vacuum port or tube (44). Additionally, Lang teaches that the vacuum or pressure of within the first and second bags should be adjusted and manipulated separately (cols. 3 and 4), and thus first and second vacuum tubes would have been prima facie obvious in the combined method in order to achieve the objectives of Lang *et al.*

Regarding claim 27, Hooper ('030) teaches a first impervious layer formed by the inner bag (32) and the mold (12). Further, Hooper ('030) teaches a second impervious layer formed by the outer bag (37) and the mold (12), wherein the second vacuum chamber includes the inner bag (32) (see Figure 1). Additionally, Lang *et al* teaches first and second bags that are first and second vacuum chambers in order to improve resin distribution, and fulfill the claimed configuration.

Regarding claims 20-21 and 39-40, Hooper ('030) teaches a resin distribution medium (24) that is positioned between the fiber preform (20) and the first vacuum (32). Further, Hooper ('030) teaches that said resin distribution medium is a mesh (see col. 4, line 58 through col. 6, line 3). It is submitted that the purpose of a resin distribution medium is to control the infusion

flow and to create flow resistance because a resin distribution system forms a screen of open space that tends to wick the resin

Specifically regarding Claim 45, Lang et al teaches a double vacuum chamber resin infusion method wherein the first vacuum chamber comprises a first space bounded by and including the inner bag and mold; and the second vacuum chamber comprises a second space bounded by and including the inner bag, the mold, and outer bag (Fig. 8, for example).

3. Claim 15 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hooper (US Patent No. 5,576,030) in view of Cochran *et al.* (US Patent No. 5,116,216), Lang *et al.* (US Patent No. 6,406,659 B1) and further in view of White et al. (725).

Hooper ('030) in view of Cochran *et al.* ('216) and Lang *et al.* ('659) teaches the basic claimed process as described above.

Regarding claim 15, Hooper ('030) in view of Cochran *et al.* ('216) and Lang *et al.* ('659) do not teach tackifying the preform by heating the first vacuum chamber prior to applying vacuum. White *et al.* (725) teach molding a fiber composite including, providing a fiber preform that includes a tackifier resin, partially curing (heating) the tackifier resin to form a tackified preform, impregnating said tackified preform with a resin and co-curing the tackifier resin and the impregnated resin to form the fiber composite (see Abstract). It would have been obvious for one of ordinary skill in the art to first heat the fiber reinforced preform in order to tackify said preform as taught by White *et al.* ('725) in the double vacuum bag process of Hooper ('030) in view of Cochran *et al.* ('216) and Lang *et al.* ('659) because, White *et al.* ('725) specifically teach that tackifying provides for net-shape molding of composites by allowing stacking of

individual layers in a single operation, which in turn reduces production time, hence increasing productivity.

4. Claim 18 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hooper (US Patent No. 5,576,030) in view of Cochran *et al.* (US Patent No. 5,116,216), Lang *et al.* (US Patent No. 6,406,659 B1) and further in view of Palmer *et al.* (US Patent No. 4,942,013).

Hooper ('030) in view of Cochran *et al.* ('216) and Lang *et al.* ('659) teaches the basic claimed process as described above.

Regarding claim 18, Hooper ('030) in view of Cochran *et al.* ('216) and Lang *et al.* ('659) do not teach providing passive vacuum chambers in the first vacuum chamber. Palmer *et al.* ('013) teach a vacuum assisted resin impregnation process including, providing passive vacuum chambers, such as, a coiled wire (spring) or a perforated tube (see col. 10, lines 12-37 and Figures 2, 2A, 2B and 2C) as an equivalent alternative to a mesh for distributing resin. Therefore, it would have been obvious for one of ordinary skill in the art to provide passive vacuum chambers as taught by Palmer *et al.* ('013) as an equivalent alternative to the mesh resin distribution medium in the process of Hooper ('030) in view of Cochran *et al.* ('216) and Lang *et al.* ('659) because, Palmer *et al.* ('013) specifically teaches that passive vacuum chambers, such as, a coiled wire (spring) or a perforated tube (see col. 10, lines 12-37 and Figures 2, 2A, 2B and 2C) are an equivalent alternative to a mesh for distributing resin.

5. Claims 19 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hooper (US Patent No. 5,576,030) in view of Cochran *et al.* (US Patent No. 5,116,216), Lang *et al.* (US Patent No. 6,406,659 B1) and further in view of White et al. (725).

Hooper ('030) in view of Cochran *et al.* ('216) and Lang *et al.* ('659) teaches the basic claimed process as described above.

Regarding claim 19, Hooper ('030) in view of Cochran *et al.* ('216) and Lang *et al.* ('659) do not teach tackifying the preform by heating the first vacuum chamber prior to applying vacuum. White *et al.* (725) teach molding a fiber composite including, providing a fiber preform that includes a tackifier resin, partially curing (heating) the tackifier resin to form a tackified preform, impregnating said tackified preform with a resin and co-curing the tackifier resin and the impregnated resin to form the fiber composite (see Abstract). It would have been obvious for one of ordinary skill in the art to first heat the fiber reinforced preform in order to tackify said preform as taught by White *et al.* ('725) in the double vacuum bag process of Hooper ('030) in view of Cochran *et al.* ('216) and Lang *et al.* ('659) because, White *et al.* ('725) specifically teach that tackifying provides for net-shape molding of composites by allowing stacking of individual layers in a single operation, which in turn reduces production time, hence increasing productivity.

6. Claims 23, 24, 41, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hooper (US Patent No. 5,576,030) in view of Cochran *et al.* (US Patent No. 5,116,216), Lang *et al.* (US Patent No. 6,406,659 B1) and further in view of Imanara *et al.* (US Patent No. 5,364,584).

Hooper ('030) in view of Cochran *et al.* ('216) and Lang *et al.* ('659) teaches the basic claimed process as described above.

Regarding claim 23, Hooper ('030) in view of Cochran *et al.* ('216) do not teach an infusion direction that is tilted at an angle from the horizontal. Imanara *et al.* ('584) teach a

molding process of a fiber reinforced matt including tilting the mold at an angle (see Figure 1). It would have been obvious for one of ordinary skill in the art to have tilted that mold assembly as taught by Imanara *et al.* ('584) in the process of Hooper ('030) in view of Cochran *et al.* ('216) and Lang *et al.* ('659) because, Imanara *et al.* ('584) specifically teach that tilting reduces the amount of voids in the final molded article, hence improving resin impregnation and product quality (see col. 4, lines 55-65).

In regard to claim 24, Imanara *et al.* ('584) teach that injection of resin occurs at a lower portion such that resin flows upwardly, hence against gravitation. Therefore, it would have been obvious for one of ordinary skill in the art to have injected resin at a lower portion of a mold such that resin flows against gravitation as taught by Imanara *et al.* ('584) in the process of Hooper ('030) in view of Cochran *et al.* ('216) and Lang *et al.* ('659) because, Imanara *et al.* ('584) specifically teach that tilting and injecting resin against gravitation reduces the amount of voids in the final molded article, hence improving resin impregnation and product quality (see col. 4, lines 55-65).

7. Claims 26 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hooper (US Patent No. 5,576,030) in view of Cochran *et al.* (US Patent No. 5,116,216), Lang *et al.* (US Patent No. 6,406,659 B1) and further in view of Stoeberl (US Patent No. 4,120,632).

Hooper ('030) in view of Cochran *et al.* ('216) and Lang *et al.* ('659) teaches the basic claimed process as described above.

Regarding claim 26 Hooper ('030) in view of Cochran *et al.* ('216) do not teach throttling the vacuum lines. Stoeberl ('132) teaches a vacuum molding process in which a resin is infused into a preform position in a mold cavity (see Figures 3c and 2b). Further, Stoeberl ('132) teaches

the idea of throttling vacuum line (13) in order to provide uniform distribution of resin (9) throughout the fiber reinforcement (1) (see col. 4, lines 35-50). It is submitted that the uniform distribution of resin in Stoeberl ('132) by throttling the vacuum line results in equal mass flow rate of resin throughout the preform and the vacuum line. Therefore, it would have been obvious for one of ordinary skill in the art to have throttled vacuum lines as taught by Stoeberl ('132) in the process of Hooper ('030) in view of Cochran *et al.* ('216) and Lang *et al.* ('659) because, Stoeberl ('132) specifically teaches that throttling of a vacuum line provides uniform resin distribution throughout the fiber reinforcement and reduces porosity by allowing air to escape, hence improving product quality.

8. **Claims 46, 47, 49, 54, 55, and 57** are rejected under 35 U.S.C. 103(a) as being unpatentable over Lang (USPN 6,406,659). **As to Claim 46**, Lang teaches a method for infusing a preform with resin disposed on a mold, the method comprising:

Forming a redundant double-bag arrangement by:

Disposing an inner bag over the preform (Fig. 8, items 193 and 185);

Sealing the inner bag to the mold to form an inner vacuum chamber defined by the inner bag and mold (Fig. 8);

Disposing an outer bag over the inner bag (Fig. 8, item 189); and

Sealing the outer bag to the mold to form an outer vacuum chamber defined by the outer bag, the inner bag, and the mold (Fig. 8);

Evacuating the vacuum chamber and inner vacuum chamber and infusing resin into the preform while substantially maintaining the pressures in the vacuum chambers (10:7-10, 5:33-64).

Lang does not specifically teach the evacuation of the vacuum chambers such that the outer chamber has a pressure approximately equal to or greater than a pressure in the inner vacuum chamber. However, Lang teaches that the vacuum or pressures in the first and second bags are separately manipulated to provide resin flow channels or resin distribution (9:60-10:28), and doing so substantially collapses the second vacuum chamber against the first vacuum chamber (Fig. 10), resulting in resin flow channels (203). Thus, in view of the teaching to manipulate pressure in the two vacuum chambers (7:15-40, 8:38-46, and Claim 1), the particular pressures represent result effective variables that the ordinary artisan would modify, adjust, and optimize in order to provide resin channels or distribution. Additionally, Lang *teaches* that in at least one embodiment, it is desirable to maintain a vacuum on both sides of the flexible membrane such that the flexible membrane does not deform (5:44-46) such that the resin presses the flexible membrane open to create channels (5:52-56). In maintaining a vacuum on both sides of a flexible membrane such that the membrane does not deform, it would have been obvious to use a second vacuum pressure equal to the first vacuum pressure during resin injection in order to avoid deformation of the first flexible membrane.

As to Claims 47 and 49, Lang teaches that the second bag presses against the first bag, which also presses against the preform, and would obviously provide a caul effect and collapsing of the outer bag substantially against the inner bag (Fig. 8, items 183, 185, 193).

As to Claim 54, Lang provides a method for infusing a preform disposed on a mold with resin comprising:

Forming a redundant double-bag arrangement by (Fig. 8):

disposing an inner bag over the preform (Fig. 8, item 185);

sealing the inner bag to the mold to form an inner vacuum chamber defined by the inner bag and the mold (Fig. 8, item 201);

disposing an outer bag over the inner bag (Fig. 8, item 189);

sealing the outer bag to the mold to form an outer vacuum chamber defined by the outer bag, inner bag, and mold (Fig. 8, items 199, 201, 189, 185);

Evacuating the vacuum chambers and infusing the resin into the preform when the vacuum chambers are evacuated (5:44-46, 10:1-10).

Lang does not explicitly teach a "caul effect", however, it is submitted that in view of the evacuation of the chamber surrounding the preform it would have been obvious that the chamber would compress such that it would obviously provide a caul effect.

As to Claim 55, Lang does not specifically teach the evacuation of the vacuum chambers such that the outer chamber has a pressure approximately equal to or greater than a pressure in the inner vacuum chamber. However, Lang teaches that the vacuum or pressures in the first and second bags are separately manipulated to provide resin flow channels or resin distribution (9:60-10:28), and doing so substantially collapses the second vacuum chamber against the first vacuum chamber (Fig. 10), resulting in resin flow channels (203). Thus, in view of the teaching to manipulate pressure in the two vacuum chambers (7:15-40, 8:38-46, and Claim 1), the particular pressures represent result effective variables that the ordinary artisan would modify,

adjust, and optimize in order to provide resin channels or distribution. Additionally, Lang *teaches* that in at least one embodiment, it is desirable to maintain a vacuum on both sides of the flexible membrane such that the flexible membrane does not deform (5:44-46) such that the resin presses the flexible membrane open to create channels (5:52-56). In maintaining a vacuum on both sides of a flexible membrane such that the membrane does not deform, it would have been obvious to use a second vacuum pressure equal to the first vacuum pressure during resin injection in order to avoid deformation of the first flexible membrane.

As to Claim 57, Lang teaches that the second bag presses against the first bag, which also presses against the preform, and would obviously provide a caul effect and collapsing of the outer bag substantially against the inner bag (Fig. 8, items 183, 185, 193).

9. **Claims 48 and 56** are rejected under 35 U.S.C. 103(a) as being unpatentable over Lang (USPN 6,406,659) in view of Cochran (USPN 5,116,216). Lang teaches the subject matter of Claims 46 and 54 above under 35 USC 103(a). **As to Claims 48 and 56**, Lang teaches a method for infusing a preform using a double-bag arrangement. However, Lang does not teach that if one chamber fails, the other maintains vacuum integrity. However, Cochran teaches first and second chambers that are individually pumped by first and second vacuums (5:22-24). In the combination of Lang, which provides first and second vacuum chambers, and Cochran, which provides independent pumping using a first and second vacuum chambers, the double bag arrangement of Lang would maintain vacuum integrity in the case of failure of one vacuum chamber. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Cochran into that of Lang because Lang clearly

suggests the ability to adjust the vacuum levels in the two chambers separately, which the first and second vacuum of Cochran would provide.

10. **Claim 50-53** are rejected under 35 U.S.C. 103(a) as being unpatentable over Lang (USPN 6,406,659) in view of Cochran (USPN 5,116,216). Lang teaches the subject matter of Claim 46 above under 35 USC 103(a). **As to Claim 50,** Lang teaches a method for infusing a preform with resin disposed on a mold, the method comprising:

Forming a redundant double-bag arrangement about the preform such that:

An inner vacuum chamber is received within an outer vacuum chamber (Fig. 8, items 193, 189 and 185);

Evacuating the vacuum chamber and inner vacuum chamber and infusing resin into the preform while substantially maintaining the pressures in the vacuum chambers (10:7-10, 5:33-64).

Lang does not specifically teach (a) if one of the vacuum chambers fails, the other maintains vacuum integrity, and (b) the evacuation of the vacuum chambers such that the outer chamber has a pressure approximately equal to or greater than a pressure in the inner vacuum chamber.

However, these aspects of the invention would have been prima facie obvious for the following reasons:

(a) Cochran teaches first and second chambers that are individually pumped by first and second vacuums (5:22-24). In the combination of Lang, which provides first and second vacuum chambers, and Cochran, which provides independent pumping using a first and second vacuum

chambers, the double bag arrangement of Lang would maintain vacuum integrity in the case of failure of one vacuum chamber.

(b) Lang teaches that the vacuum or pressures in the first and second bags are separately manipulated to provide resin flow channels or resin distribution (9:60-10:28), and doing so substantially collapses the second vacuum chamber against the first vacuum chamber (Fig. 10), resulting in resin flow channels (203). Thus, in view of the teaching to manipulate pressure in the two vacuum chambers (7:15-40, 8:38-46, and Claim 1), the particular pressures represent result effective variables that the ordinary artisan would modify, adjust, and optimize in order to provide resin channels or distribution. Additionally, Lang *teaches* that in at least one embodiment, it is desirable to maintain a vacuum on both sides of the flexible membrane such that the flexible membrane does not deform (5:44-46) such that the resin presses the flexible membrane open to create channels (5:52-56). In maintaining a vacuum on both sides of a flexible membrane such that the membrane does not deform, it would have been obvious to use a second vacuum pressure equal to the first vacuum pressure during resin injection in order to avoid deformation of the first flexible membrane.

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Cochran into that of Lang because Lang clearly suggests the ability to adjust the vacuum levels in the two chambers separately, which the first and second vacuum of Cochran would provide.

As to Claim 51, the preform of Lang is disposed on a mold, and Lang provides redundant vacuum chambers by sealing the inner bag to the mold to form the inner vacuum chamber defined by the inner bag and the mold, disposing an outer bag over the inner bag, and sealing the

outer bag to the mold to form the outer vacuum chamber defined by the outer bag, inner bag, and mold (Fig. 8).

As to Claims 52 and 53, Lang teaches that the second bag presses against the first bag, which also presses against the preform, and would provide a caul effect and collapsing of the outer bag substantially against the inner bag (Fig. 8, items 183, 185, 193).

Response to Arguments

11. Applicant's arguments filed 17 April 2007 have been fully considered but they are not persuasive. The arguments appear to be on the following grounds:

a) With regard to the rejection of Claims 13 and 34, Hooper does not teach or suggest the two vacuum chambers or sealingly bagging them to a mold.

b) Lang teaches away from Claim 13 by applying a differential pressure such that the pressure is greater on the preform side to form resin distribution channels. "Every embodiment of Lang relies upon the temporary creation of resin distribution channels to distribute the resin above the preform prior to resin flowing into the preform…" (Page 16).

c) Cochran is directed to a pre-preg, and is therefore not analogous.

d) It is not possible for the second vacuum chamber of Cochran to collapse against the first vacuum chamber.

12. These arguments are not persuasive for the following reasons:

a) In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on

combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Hooper provides two layers. Although they are not individual vacuum chambers, vacuum is applied to both simultaneously such that the vacuum in both chambers is equal, as claimed. However, in the combination with Lang, it is demonstrated that impregnation processes using two (complete and individual) vacuum bags are known.

b) It is respectfully submitted that Applicants' arguments do not appear to consider the teaching of Lang in Col. 5, particularly lines 44-46. In this embodiment, it is disclosed that a vacuum is maintained on both sides of the flexible membrane such that it *does not deform*. Injection of the resin subsequently expands resin channels.

The Examiner maintains the position set forth previously that the pressures or ratio of pressures is a result effective variable and that one would find it obvious to arrive at the claimed ratio by adjusting and optimizing the respective pressures. Additionally, in view of the portion of Col. 5 cited above, it is submitted that the ordinary artisan would find it obvious that in order to provide a flexible membrane that is not deformed with vacuum on both sides, one would adjust the vacuum level on both sides of the membrane to be the same.

c) The teaching of a pre-preg versus a process for impregnating a preform does not separate the method of Cochran into a different field of endeavor. It is submitted that the Cochran reference is within the same field of endeavor as being drawn to a resin-impregnated fibrous material. Additionally, please consider MPEP 2144.04(IV)(c) which provides support for a position that it is obvious to rearrange or reverse process steps including laminating and impregnation with resin (*Ex parte Rubin*). It is submitted that if it is generally considered to be obvious to rearrange

process steps such that they are performed in a reverse order (impregnation versus pre-impregnation), then Cochran's teaching of a pre-impregnation process would not separate the reference into a different field of endeavor because it is an obvious variation in the order of steps over an impregnation processes.

d) Lang provides a collapsing second vacuum chamber. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Daniels whose telephone number is (571) 272-2450. The examiner can normally be reached on Monday - Friday, 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MJD 8/13/07

MJD

CHRISTINA JOHNSON
SUPERVISORY PATENT EXAMINER